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KATHRYN A MARRA
General Motors Corporation
Legal Staff, Mail Code 482-C23-B21
P.O. Box 300
Detroit, MI 48265-3000

EXAMINER	
MERKLING, MATTHEW J	
ART UNIT	PAPER NUMBER
1709	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/763,951	JOHNSON ET AL.	
	Examiner	Art Unit	
	Matthew J. Merkling	1709	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/23/2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/12/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 10 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claim refers to a "semi-conductive material" that is selected from a group of conductive metals and no procedure is set forth in the specification detailing how one skilled in the art would form the semi-conductive material out of the listed conductive metals. For purposes of this examination, the semi-conductive group will be interpreted as containing one of the claimed materials.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 7, 8, 10, 16, 17 and 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 7 and 24, the claims refer to "synchronizing the introduction of at least one of the group". These claims are indefinite, as they do not point out what "at least one of the group" is being synchronized with. For purposes of this examination, these claims will be treated as reading to be synchronized with a parameter indicating the clearness of a filter passageway (i.e. pressure differential).

Regarding claim 8, the claim refers to "alternating the introduction of at least one of the group". This claim is indefinite, as it does not point out what "at least one of the group" is alternating with. For purposes of this examination, this claim will be treated as alternating in the open/close position.

Claim 10 recites the limitation "the semi-conductive material" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Regarding claim 16, in line 1 of the claim, it is indefinite what the term "particles" encompasses. For purposes of this examination, the term "particles", as used in this claim, will be interpreted as "the catalyst nanoparticles" of the prior claims.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al (US 2002/0006368) in view of Zhou (US 6,500,969).

Regarding claim 1, Becker discloses:

A fluidized-bed oxidation reactor comprising:

a chamber (Fig. 1 (1)) defining a hollow interior region and having a lower surface (4);

a first input (6) for introducing a gas into the hollow interior region;

a plurality of particles (2) within the hollow interior region and located on the lower surface (4), and;

a fluidizing input (10) for introducing a fluidizing material into the hollow interior region (gas, paragraph 32 lines 4-5), said fluidizing input having an outlet directed at the lower surface of the chamber (see Fig. 1 (10), paragraph 26 lines 3-5).

Regarding the claimed limitation:

"wherein the introduction of the fluidizing material directed at the lower surface fluidizes at least a portion of the catalyst nanoparticles located on the lower surface to create a gaseous dispersion of catalyst nanoparticles that reacts with the contaminated gas to produce a decontaminated gas."

This does not add any structure to the claimed apparatus and simply states the intended used of said apparatus. MPEP §2115.

Becker fails to teach the plurality of catalysts as being nanoparticles.

Zhou also discloses an oxidation process (as does Becker) and the type of catalyst used in said oxidation process.

Zhou teaches nanoparticles being utilized as the catalyst in an oxidation reaction in order to ensure high activity and selectivity of desired oxidation products (col. 5 lines 34-43).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the nanoparticles of Zhou in the fluidized bed oxidation reactor of Becker in order to ensure high activity and selectivity of the desired oxidation products.

Regarding claim 2, Becker, further discloses that the nanoparticles will be fluidized by the inlet of gas from the first inlet (paragraph 32 lines 4-8).

Regarding claim 3, Becker further discloses a fluidized-bed chamber comprising a port (Fig. 1, (8)) for the exit of the decontaminated gas out of the hollow interior region (paragraph 35 line 9).

Regarding claim 21, Becker discloses a method of removing contaminants from a contaminated gas comprising:

A fluidized-bed oxidation reactor comprising:

a chamber (Fig. 1 (1)) defining a hollow interior region and having a lower surface (4);

a first input (6) for introducing a gas into the hollow interior region;

a plurality of particles (2) within the hollow interior region and located on the lower surface (4), and;

a fluidizing input (10) for introducing a fluidizing material into the hollow interior region (gas, paragraph 32 lines 4-5), said fluidizing input having an outlet directed at the lower surface of the chamber (see Fig. 1 (10), paragraph 26 lines 3-5).

Becker fails to teach the plurality of catalysts as being nanoparticles.

Zhou also discloses an oxidation process (as does Becker) and the type of catalyst used in said oxidation process.

Zhou teaches nanoparticles being utilized as the catalyst in an oxidation reaction in order to ensure high activity and selectivity of desired oxidation products (col. 5 lines 34-43).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the nanoparticles of Zhou in the fluidized bed oxidation reactor of Becker in order to ensure high activity and selectivity of the desired oxidation products. (as noted above) and further discloses introducing a recycle/contaminated gas into the hollow interior region

(paragraph 32). Becker also discloses introducing a fluidizing material (gas, paragraph 35 lines 6-7) directed at the lower surface (see Fig. 1 (10)).

7. Claims 4, 5, 7, 8, 22, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker and Zhou as applied to claim 3 above, and further in view of Alford et al. (US 6,887,291).

Regarding claim 4, the modified Becker discloses all of the claim's limitations, including a second input (Fig. 1 (7)), but does not disclose an input for introducing a backpressure pulse of gaseous material.

Alford also discloses a filter device for removing nanomaterials from gas streams using a gas permeable separating device (Fig.1 (2), see Abstract).

Alford teaches a second input (5) for introducing a backpressure pulse (pulse jet) of gaseous material into a hollow interior region (10) (col. 7 lines 59-67) in order to clean a filter (col. 7 lines 43-55).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the backpressure pulse input of Alford with the fluidized bed oxidation reactor with nanoparticles of the modified Becker in order to clean the filter that is used to separate the nanoparticles from the gas stream with the second input.

Regarding claim 5 and 22 and 23, the modified Becker discloses all of the claim's limitations but fails to teach:

a gas permeable separation device in communication with said port and the exit of gas from the hollow interior region through the gas permeable separation device,

the gas permeable separation device also in communication with the second input, and

an entrance of the backpressure pulse into the hollow interior region displacing collected catalyst nanoparticles.

Alford also discloses a filter device for removing nanomaterials from gas streams using a gas permeable separating device (Fig.1 (2), see Abstract).

Alford teaches a gas permeable separation device (filter, 2) in communication with a hollow interior region (10) and the second input (5) and the entrance for introducing a backpressure pulse (pulse jet) into the hollow interior region (10) displacing collected catalyst nanoparticles (col. 7 lines 43-55). Alford teaches this in order to allow catalyst nanoparticles to be collected by said gas permeable separation device (filter) and to clean said gas permeable separation device of said catalyst nanoparticles (col. 7 lines 35-67).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the gas permeable separation device (in communication with the second input) and the entrance of the backpressure pulse into the hollow interior region to displace the collected nanoparticles of Alford, with the fluidized bed oxidation reactor of the

modified Becker in order to allow catalyst nanoparticles to be collected by said gas permeable separation device and to clean said gas permeable separation device of said catalyst nanoparticles.

Regarding claims 7, 8, and 24, the modified Becker discloses all of the claim's limitations, but does not teach synchronizing/alternating the introduction of at least one of the group consisting of backpressure pulse, contaminated gas, or fluidizing material.

Alford teaches the introduction of the backpressure pulses to be synchronized with the rise in pressure in order to clean the filter before vessel pressure becomes too high (col. 6 lines 2-5). Alford also teaches that the backpressure pulses will be alternating on and off during operation to create gas pulses and form a shockwave that vibrates and dislodges the material collected on the filter (col. 8 lines 1-6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the synchronizing/alternating of the backpressure pulses into a reactor of Alford to the gas permeable separation device of the fluidized-bed oxidation reactor of Becker in order to clean the filter (gas permeable separation device) before reactor pressure becomes too high, and to create gas pulses that form shockwaves that vibrate and dislodge material collected on the filter.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Becker and Zhou as applied to claim 1 above, and further in view of Goswami (US 5,933,702).

Regarding claim 6, the modified Becker discloses all of the claims limitations, as discussed with respect to claim 1 above, but does not teach a humidifier in communication with the first input (gas inlet).

Goswami also discloses a photocatalytic/oxidation reactor for reacting a gas to remove contaminants via oxidation.

Goswami discloses a humidifier (Fig. 1 (50)) on the gas inlet (18) to a photocatalytic/oxidation reactor (21) in order to provide the correct relative humidity for the complete oxidation and destruction of a microorganism in the photocatalytic/oxidation reactor (col. 7 line 60 – col. 8 line 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the humidifier and photocatalytic/oxidation reactor of Goswami with the fluidized bed oxidation reactor of Becker in order to ensure the correct humidity for the complete oxidation and destruction of said microorganisms.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Becker and Zhou as applied to claim 1 above, and further in view of Sherman (US 6,653,356).

Regarding claim 9, the modified Becker discloses all of the claim's limitations as applied to claim 1 above, but does not disclose the nanoparticles comprising a semi-conductive material.

Sherman discloses the production of photocatalytic nanoparticles and describes there uses therein, such as its anti-microbial (catalytic oxidation) properties.

Sherman teaches that a type of photocatalytic material to be used as nanoparticles is titanium dioxide (semi-conductive) in order to save costs and leverage anti-microbial effects in the presence of ultraviolet light (Abstract and col. 1 lines 28-38).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the photocatalytic nanoparticles comprising a semi-conductive material of Sherman in the fluidized bed oxidation reactor of the modified Becker in order to save costs and leverage anti-microbial effects in the presence of ultraviolet light.

10. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker and Zhou as applied to claim 1 above, and further in view of Matsubara et al. (US 5,993,624).

Regarding claims 9 and 10, the modified Becker discloses all of the claims limitations, as applied to claim 1 above, but does not disclose the catalytic nanoparticles comprising a semi-conductive material.

Matsubara also teaches a catalyst for decomposition of a contaminant.

Matsubara teaches that a preferable catalyst contains a semiconductor, copper oxide (col. 3 lines 31-32) in order to decompose a contaminant (a carbonate) in a gas (col. 3 lines 24-30).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the catalyst containing a copper oxide semiconductor of Matsubara to the nanoparticles in the fluidized oxidation reactor of Becker in order to decompose a contaminant (a carbonate).

11. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker and Zhou as applied to claim 1 above, and further in view of Wu (US 2002/0187082).

Regarding claims 11 and 12, the modified Becker discloses all of the claim's limitations as discussed in claim 1 above, but fails to teach an ultraviolet light as well as the ultraviolet light within the hollow interior region of the chamber.

Wu teaches a photocatalytic/oxidation reactor (Fig. 3(a) (315)) which uses photocatalysts to treat polluted air.

Wu also teaches an ultraviolet light (320) in order to facilitate chemical reactions in photocatalysis (paragraph 8, lines 1-4). Wu further teaches said ultraviolet light being positioned within the hollow interior of the chamber (315). It is well known in the art that positioning the ultraviolet light inside the reactor or chamber maximize the exposure of the

photocatalyst or the photoactive material, as is shown by Sanderson (US 2005/0079124, paragraph 113).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the internally positioned ultraviolet light of Wu with fluidized bed oxidation reactor of the modified Becker in order to facilitate chemical reactions in photocatalysis and maximize the exposure of the photocatalyst.

12. Claims 11 and 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Becker and Zhou as applied to claim 1 above, and further in view of Sato (US 6,812,470).

Regarding claims 11 and 13, the modified Becker discloses all of the claims limitations, as discussed in claim 1 above, but fails to teach the ultraviolet light positioned outside of the chamber/reactor.

Sato also discloses a photocatalytic/oxidation reactor chamber (Fig. 2 (50)).

Sato teaches an ultraviolet light (80) positioned outside of the reactor chamber in order to facilitate preventing the ultraviolet light from overheating by using a fan blowing external air (col. 5 lines 18-24).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the external ultraviolet light of Sato with the photocatalytic/oxidation reactor of the modified Becker in order to facilitate

prevention of the ultraviolet light overheating by using a fan blowing external air.

13. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Becker and Zhou and Wu as applied to claim 11 above, and further in view of Goswami (US 5,933,702).

Regarding claim 14, the modified Becker discloses all of the claims limitations, as discussed in claim 11 above, but does not teach a humidifier in communication with the first input (gas inlet).

Goswami teaches a photocatalytic/oxidation reactor for reacting a gas to remove contaminants.

Goswami also teaches a humidifier (Fig. 1 (50)) on the gas inlet (18) to a photocatalytic/oxidation reactor (21) in order to provide the correct relative humidity for the complete oxidation and destruction of a microorganism in the photocatalytic reactor (col. 7 line 60 – col. 8 line 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the humidifier and photocatalytic/oxidation reactor of Goswami with the fluidized bed photocatalytic/oxidation reactor of the modified Becker in order to ensure the correct humidity for the complete oxidation and destruction of said microorganisms.

14. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Becker and Zhou and Wu as applied to claim 11 above, and further in view of Sherman (US 6,653,356).

Regarding claim 15, the modified Becker teaches all of the claim's limitations as discussed in claim 11 above, but does not disclose groups included in the photocatalytic material.

Sherman teaches the production of photocatalytic nanoparticles and describes uses therein, such as its anti-microbial (catalytic oxidation) properties.

Sherman also teaches that a type of photocatalytic material to be used on nanoparticles is titanium dioxide in order to save costs and leverage anti-microbial effects in the presence of ultraviolet light (Abstract and paragraph 4).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the titanium dioxide nanoparticles of Sherman with the oxidation/photocatalytic reactor and the nanoparticles of the modified Becker in order to save costs and leverage antimicrobial effects in the presence of ultraviolet light.

15. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker and Zhou and Wu as applied to claim 11 above, and further in view of Wei et al. (US 2005/0129591).

Regarding claims 16 and 17, the modified Becker discloses all of the claims limitations as discussed in claim 11 above, but does not teach a nanoparticle comprising a metal oxide and a co-catalyst.

Wei discloses a photocatalyst for air quality treatment (see title).

Wei teaches a nanoparticle photocatalyst that contains a metal oxide (titanium oxide) in order to destroy contaminants in an air purifier (paragraph 3 lines 1-2). Wei also teaches a co-catalyst (gold) in order to act together with the titanium dioxide as an effective thermocatalyst for room temperature oxidation of carbon monoxide to carbon dioxide (paragraph 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the metal oxide photocatalyst and gold co-catalyst of Wei with the fluidized photocatalytic/oxidation reactor of Becker in order to destroy air contaminants and oxidize carbon monoxide to carbon dioxide at room temperature.

16. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker and Zhou as applied to claim 1 above, and further in view of Sigai (US 4,585,673).

Regarding claims 18-20, the modified Becker discloses all of the claims limitations as discussed in claim 1 above, but does not teach a means for agitating the catalyst nanoparticles in the hollow interior region.

Sigai also discloses a fluidized bed chamber (Fig. 1 (15)).

Sigai teaches an agitation/vibrating/shaking system (Fig. 1 (17,19)) in order to fluidize a suspended solid (in this case, phosphor powder) and improve the expansion of the fluidized bed (col. 4 lines 46-50).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the agitation/shaking/vibrating means of Sigai with the fluidized bed oxidation reactor of Becker in order to fluidize the suspended solid and improve the expansion of the fluidized bed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Merkling whose telephone number is 571-272-9813. The examiner can normally be reached on Monday - Friday 8:30-4:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa D. Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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MJM

ALEXA D. NECKEL
SUPERVISORY PATENT EXAMINER